UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/918,853	07/30/2001	Michael A. Vyvoda	10519/29	6398

7590 12/14/2004

BRINKS HOFER GILSON & LIONE
SUITE 3600
455 NORTH CITYFRONT PLAZA DRIVE
CHICAGO, IL 60611

EXAMINER	
TOLEDO, FERNANDO L	
ART UNIT	**PAPER NUMBER**
2823	

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/918,853	VYVODA ET AL.
	Examiner	Art Unit
	Fernando L. Toledo	2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 September 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-153* is/are pending in the application.

4a) Of the above claim(s) *25-34 and 41-54* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24,35-40 and 55-153* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 113 – 117, 119, 122 – 124, 126, 128, 130 – 132, 134 – 136, 137 – 140, 142 – 145 and 147 – 153 are rejected under 35 U.S.C. 102(e) as being e by Thomas, Michael (U. S. patent 6,509,283 B1).

In re claim 113, Thomas in the U. S. patent 6,509,283 B1; figures 1 – 4 and related text, discloses, exposing an oxidizable surface to an oxidizing plasma, wherein the oxidizing plasma has an activity relative to the oxidizable surface; forming an oxide film on the oxidizable surface; and regulating the oxidizing plasma activity to limit a rate of formation of the oxide film (Column 3).

3. In re claim 114, Thomas discloses wherein regulating the oxidizing plasma activity includes bombarding the oxidizable surface with energized ions prior to exposing the oxidizable surface to the oxidizing plasma (Column 1).

4. In re claim 115, Thomas discloses wherein bombarding the oxidizable surface includes bombarding the oxidizable surface to remove contaminants from the oxidizable surface (Column 1).

5. In re claim 116, Thomas discloses wherein bombarding the oxidizable surface includes bombarding the oxidizable surface to remove other oxide layer present on the oxidizable surface (Column 1).

6. In re claim 117, Thomas discloses wherein bombarding the oxidizable surface includes bombarding the oxidizable surface to facet the oxidizing surface (Column 1).

7. In re claim 119, Thomas discloses wherein regulating the oxidizing plasma activity includes diluting the oxidizing plasma with an inert gas (Column 2).

8. In re claim 122, Thomas discloses providing a plasma chamber; placing a substrate in the plasma chamber; and igniting the oxidizing plasma after placing the substrate in the plasma chamber (Figure 3).

9. In re claim 123, Thomas discloses further includes igniting an inert gas plasma prior to igniting the oxidizing plasma (Figure 3).

10. In re claim 124, Thomas discloses further including placing the oxidizable surface in the inert gas plasma (Figure 3).

11. In re claim 126, Thomas discloses wherein the oxidizable surface includes silicon (Figure 1).

12. In re claim 128, Thomas discloses wherein exposing an oxidizable surface to an oxidizing plasma includes exposing the oxidizable surface to a plasma including oxygen (Figure 3).

13. In re claim 130, Thomas discloses forming a semiconductor layer; exposing the semiconductor layer to a plasma including oxygen, wherein the plasma has an activity relative to the semiconductor layer; forming an oxide film on the semiconductor layer; and regulating the plasma activity to limit a rate formation of the oxide film (Column 3).

14. In re claim 131, Thomas discloses wherein the step of forming a semiconductor layer includes forming a doped semiconductor layer (Figure 1).

15. In re claim 132, Thomas discloses wherein the step of forming a semiconductor layer includes forming a silicon layer (Figure 1).

16. In re claim 134, Thomas discloses further including an electrically conductive layer prior to forming the semiconductor layer (Column 1).

17. In re claim 135, Thomas discloses wherein the oxide film includes a gate oxide layer (Column 1).

18. In re claim 136, Thomas discloses wherein the oxide film includes a passivation layer (Column1).

19. In re claim 137, Thomas discloses exposing an oxidizable surface to a plasma including an oxygen species and a nitrogen species, wherein the plasma has an activity relative to the oxidizable surface; forming an oxynitride film on the oxidizable surface; and regulating the plasma activity to limit a rate of formation of the oxynitride film (Abstract and Figure 3).

20. In re claim 138, Thomas discloses wherein the nitrogen species includes a compound selected from the group consisting of nitrogen, ammonia and nitrous oxide (Figure 3).

21. In re claim 139, Thomas discloses wherein the step of forming an oxynitride film includes a gate oxide layer (Figure 1).

22. In re claim 140, Thomas discloses wherein the step of forming an oxynitride film includes a passivation layer (Figure 1).

23. In re claim 142, Thomas discloses further including subjecting the oxidizable surface to a plasma containing a nitrogen species prior to exposing the oxidizable surface to a plasma including an oxygen species and a nitrogen species (Figure 3).

24. In re claim 143, Thomas discloses wherein subjecting the oxidizable surface to a plasma containing a nitrogen species includes subjecting the oxidizable surface to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Figure 3).

25. In re claim 144, Thomas discloses exposing an oxidizable surface to a plasma including oxygen, wherein the plasma has an activity relative to the oxidizable surface; forming an oxide film on the oxidizable surface; regulating the plasma activity to limit a rate of formation of the oxide film; and forming a silicon nitride layer overlying the oxide film (Column 3).

26. In re claim 145, Thomas discloses wherein the step of forming a silicon nitride layer includes plasma deposition of silicon nitride (Column 3).

27. In re claim 147, Thomas discloses further including subjecting the oxidizable surface to a plasma containing nitrogen species prior to exposing the oxidizable surface to a plasma including oxygen (Column 3).

28. In re claim 148, Thomas discloses wherein subjecting the oxidizable surface to a plasma containing a nitrogen species includes subjecting the oxidizable surface to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Column 3).

29. In re claim 149, Thomas discloses exposing an oxidizable surface to a plasma including an oxygen species, wherein the plasma has an activity relative to the oxidizable surface; forming an oxide film having an upper surface on the oxidizable surface; regulating the plasma activity to

limit a rate of formation of the oxide film; and forming an oxynitride region at the upper surface of the oxide film (Column 3).

30. In re claim 150, Thomas discloses wherein the step of forming an oxynitride region includes subjecting the oxide film to plasma containing a nitrogen plasma (Column 3).

31. In re claim 151, Thomas discloses wherein subjecting the oxide film to a plasma containing nitrogen species includes subjecting the oxide film to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Column 3).

32. In re claim 152, Thomas discloses further including subjecting the oxidizable surface to a plasma containing a nitrogen species prior to exposing the oxidizable surface to a plasma including oxygen (Column 3).

33. In re claim 153, Thomas discloses wherein subjecting the oxidizable surface to a plasma containing a nitrogen species includes subjecting the oxidizable surface to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Column 3).

Claim Rejections - 35 USC § 103

34. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

35. Claims 118, 121, 125 and 129 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas as applied to claims 113 – 117, 119, 122 – 124, 126, 128, 130 – 132, 134 – 136,

137 – 140, 142 – 145 and 147 – 153 above, and further in view of Kwan et al. (U. S. patent 6,335,288 B1).

In re claims 118 and 129, Thomas does not teach wherein bombarding the oxidizable surface with energized ions includes subjecting the oxidizable surface to a bias voltage.

However, Kwan in the U. S. patent 6,335,288 B1; figures 1A – 3 and related text, discloses bombarding the oxidizable surface with energized ions includes subjecting the oxidizable surface to a bias voltage since the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate (Column 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to bombard the oxidizable surface with energized ions includes subjecting the oxidizable surface to a bias voltage, in the invention of Thomas, since, according to Kwan, the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate.

36. In re claim 121, Thomas does not teach wherein regulating the oxidizing plasma activity includes applying an RF bias voltage to the oxidizable surface.

However, Kwan discloses regulating the oxidizing plasma activity includes applying an RF bias voltage to the oxidizable surface, since; the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the +surface of the substrate (Column 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to regulate the oxidizing plasma activity includes applying an RF bias

voltage to the oxidizable surface, in the invention of Thomas, since, according to Kwan, the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate.

37. In re claim 125, Thomas does not teach further including providing a plasma power source having an output power, and wherein regulating the oxide plasma includes limiting the output power to a predetermined level.

Kwan discloses providing a plasma power source having an output power, and wherein regulating the oxide plasma includes limiting the output power to a predetermined level, since; the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate (Column 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a plasma power source having an output power, and wherein regulating the oxide plasma includes limiting the output power to a predetermined level, in the invention of Thomas, since, according to Kwan, the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate.

38. Claim 120 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas as applied to claims 113 – 117, 119, 122 – 124, 126, 128, 130 – 132, 134 – 136, 137 – 140, 142 – 145 and 147 – 153 above, and further in view of Denison et al. (U. S. patent 5,869,149).

In re claim 120, Thomas discloses further including providing a substrate having a back surface opposite a face surface, wherein the oxidizable surface includes at least a portion of the face surface.

Thomas does not disclose wherein regulating the oxidizing plasma activity includes contacting the back surface with a cooling medium.

Denison in the U. S. patent 5,869,149; figures 1 – 6 and related text, discloses contacting the back surface with a cooling medium to prevent a rise in temperature of the substrate due to the plasma action (Column 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to contact the back surface with a cooling medium in the invention of Thomas, since, according to Denison, prevents a rise in temperature of the substrate due to the plasma action.

39. Claims 127 and 141 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas as applied to claims 113 – 117, 119, 122 – 124, 126, 128, 130 – 132, 134 – 136, 137 – 140, 142 – 145 and 147 – 153 above, and further in view of Cleeves et al. (U. S. patent 6,541,312 B2).

In re claims 127 and 141, Thomas does not disclose wherein the oxidizable surface includes a semiconductor element of an antifuse device.

However, Cleeves in the U. S. patent 6,541,312 B2; figures 1 – 16B and related text discloses that oxide layers can be antifuse devices (Column 10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form an antifuse device in the invention of Thomas, since as disclosed by Cleeves, antifuse devices can be formed with oxides.

40. Claim 146 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas as applied to claims 113 – 117, 119, 122 – 124, 126, 128, 130 – 132, 134 – 136, 137 – 140, 142 – 145 and 147 – 153 above, and further in view of Kawakami et al. (U. S. patent 6,399,520 B1).

Thomas does not disclose wherein the step of forming a silicon nitride layer includes chemical vapor deposition of silicon nitride.

However, Kawakami in the U. S. patent 6,399,520 B1; figures 1A – 14 and related text, discloses that a high quality SiN layer can be formed, in a short time by CVD method (Column 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a silicon nitride layer includes chemical vapor deposition of silicon nitride, in the invention of Thomas, since, according to Kawakami, a high quality SiN layer can be formed, in a short time by CVD method.

41. Claim 133 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas as applied to claims 113 – 117, 119, 122 – 124, 126, 128, 130 – 132, 134 – 136, 137 – 140, 142 – 145 and 147 – 153 above.

Thomas does not show wherein the step of forming a semiconductor layer includes forming a germanium layer.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to exchange silicon with germanium since it is well known in the art that germanium is a formidable semiconductor material and silicon and germanium are art recognized equivalent for the disclose intended purposes. Also, it has been held to be within the general

skill of a worker in the art to select a known material on the base of its suitability, for its intended use involves only ordinary skill in the art. *In re Leshin*, 125 USPQ 416.

42. Claims 1 – 5, 7, 10 – 12, 14, 16, 18 – 20, 22 – 24, 35, 38 – 40, 55 – 58, 60 – 63 and 65 – 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view of Moon et al. (US 2002/0137266 A1).

In re claim 1, Thomas in the U. S. patent 6,509,283 B1; figures 1 – 4 and related text, discloses, exposing an oxidizable surface to an oxidizing plasma, wherein the oxidizing plasma has an activity relative to the oxidizable surface; forming an oxide film on the oxidizable surface; and regulating the oxidizing plasma activity to limit a rate of formation of the oxide film (Column 3).

Thomas does not show wherein the oxide film grows to a predetermined thickness at an end of an initial exposure time to the oxidizing plasma.

However, Moon, in the U.S. Patent Application Publication US 2002/0137266 A1; figures 1 – 8 and related text, discloses that an oxide layer will not increase substantially beyond an initial exposure time (Figure 6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the oxide film grows to a predetermined thickness at an end of an initial exposure time to the oxidizing plasma, and wherein additional exposure to the oxidizing plasma beyond the initial exposure time does not result in a significant further increase in thickness of the oxide film, since, as taught by Moon, an oxide layer will not grow substantially beyond an initial exposure time.

43. In re claim 2, Thomas discloses wherein regulating the oxidizing plasma activity includes bombarding the oxidizable surface with energized ions prior to exposing the oxidizable surface to the oxidizing plasma (Column 1).

44. In re claim 3, Thomas discloses wherein bombarding the oxidizable surface includes bombarding the oxidizable surface to remove contaminants from the oxidizable surface (Column 1).

45. In re claim 4, Thomas discloses wherein bombarding the oxidizable surface includes bombarding the oxidizable surface to remove other oxide layer present on the oxidizable surface (Column 1).

46. In re claim 5, Thomas discloses wherein bombarding the oxidizable surface includes bombarding the oxidizable surface to facet the oxidizing surface (Column 1).

47. In re claim 7, Thomas discloses wherein regulating the oxidizing plasma activity includes diluting the oxidizing plasma with an inert gas (Column 2).

48. In re claim 10, Thomas discloses providing a plasma chamber; placing a substrate in the plasma chamber; and igniting the oxidizing plasma after placing the substrate in the plasma chamber (Figure 3).

49. In re claim 11, Thomas discloses further includes igniting an inert gas plasma prior to igniting the oxidizing plasma (Figure 3).

50. In re claim 12, Thomas discloses further including placing the oxidizable surface in the inert gas plasma (Figure 3).

51. In re claim 14, Thomas discloses wherein the oxidizable surface includes silicon (Figure 1).

52. In re claim 16, Thomas discloses wherein exposing an oxidizable surface to an oxidizing plasma includes exposing the oxidizable surface to a plasma including oxygen (Figure 3).

53. In re claim 18, Thomas discloses forming a semiconductor layer; exposing the semiconductor layer to a plasma including oxygen, wherein the plasma has an activity relative to the semiconductor layer; forming an oxide film on the semiconductor layer; and regulating the plasma activity to limit a rate formation of the oxide film (Column 3).

Thomas does not show wherein the oxide film grows to a predetermined thickness at an end of an initial exposure time to the oxidizing plasma.

However, Moon, discloses that an oxide layer will not increase substantially beyond an initial exposure time (Figure 6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the oxide film grows to a predetermined thickness at an end of an initial exposure time to the oxidizing plasma, and wherein additional exposure to the oxidizing plasma beyond the initial exposure time does not result in a significant further increase in thickness of the oxide film, since, as taught by Moon, an oxide layer will not grow substantially beyond an initial exposure time.

54. In re claim 19, Thomas discloses wherein the step of forming a semiconductor layer includes forming a doped semiconductor layer (Figure 1).

55. In re claim 20, Thomas discloses wherein the step of forming a semiconductor layer includes forming a silicon layer (Figure 1).

56. In re claim 22, Thomas discloses further including an electrically conductive layer prior to forming the semiconductor layer (Column 1).

57. In re claim 23, Thomas discloses wherein the oxide film includes a gate oxide layer (Column 1).

58. In re claim 24, Thomas discloses wherein the oxide film includes a passivation layer (Column1).

59. In re claim 35, Thomas discloses exposing an oxidizable surface to a plasma oxidation process for an initial exposure time; and growing an oxide film on the oxidizable surface, and wherein the plasma process is configured such that the oxide film grows to a predetermined thickness substantially independent of an exposure time beyond the initial exposure time (Column 3).

Thomas does not show wherein the oxide film grows to a predetermined thickness at an end of an initial exposure time to the oxidizing plasma, and wherein additional exposure to the oxidizing plasma beyond the initial exposure time does not result in a significant further increase in thickness of the oxide film.

However, Moon, discloses that an oxide layer will not increase substantially beyond an initial exposure time (Figure 6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the oxide film grows to a predetermined thickness at an end of an initial exposure time to the oxidizing plasma, and wherein additional exposure to the oxidizing plasma beyond the initial exposure time does not result in a significant further increase in thickness of the oxide film, since, as taught by Moon, an oxide layer will not grow substantially beyond an initial exposure time.

60. In re claim 38, Thomas discloses wherein the plasma oxide process includes generating a plasma includes oxygen and an inert gas (Figure 3).

61. In re claim 39, Thomas discloses further including subjecting the oxidizable surface to a plasma containing a nitrogen species prior to exposing the oxidizable surface to a plasma oxidation process (Figure 3).

62. In re claim 40, Thomas discloses wherein subjecting the oxidizable surface to a plasma containing a nitrogen species includes subjecting the oxidizable surface to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Figure 3).

63. In re claim 55, Thomas discloses exposing an oxidizable surface to a plasma including an oxygen species and a nitrogen species, wherein the plasma has an activity relative to the oxidizable surface; forming an oxynitride film on the oxidizable surface; and regulating the plasma activity to limit a rate of formation of the oxynitride film (Abstract and Figure 3).

Thomas does not show wherein the oxide film grows to a predetermined thickness at an end of an initial exposure time to the oxidizing plasma.

However, Moon, discloses that an oxide layer will not increase substantially beyond an initial exposure time (Figure 6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the oxide film grows to a predetermined thickness at an end of an initial exposure time to the oxidizing plasma, and wherein additional exposure to the oxidizing plasma beyond the initial exposure time does not result in a significant further increase in thickness of the oxide film, since, as taught by Moon, an oxide layer will not grow substantially beyond an initial exposure time.

64. In re claim 56, Thomas discloses wherein the nitrogen species includes a compound selected from the group consisting of nitrogen, ammonia and nitrous oxide (Figure 3).

65. In re claim 57, Thomas discloses wherein the step of forming an oxynitride film includes a gate oxide layer (Figure 1).

66. In re claim 58, Thomas discloses wherein the step of forming an oxynitride film includes a passivation layer (Figure 1).

67. In re claim 60, Thomas discloses further including subjecting the oxidizable surface to a plasma containing a nitrogen species prior to exposing the oxidizable surface to a plasma including an oxygen species and a nitrogen species (Figure 3).

68. In re claim 61, Thomas discloses wherein subjecting the oxidizable surface to a plasma containing a nitrogen species includes subjecting the oxidizable surface to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Figure 3).

69. In re claim 62, Thomas discloses exposing an oxidizable surface to a plasma including oxygen, wherein the plasma has an activity relative to the oxidizable surface; forming an oxide film on the oxidizable surface; regulating the plasma activity to limit a rate of formation of the oxide film; and forming a silicon nitride layer overlying the oxide film (Column 3).

Thomas does not show wherein the oxide film grows to a predetermined thickness at an end of an initial exposure time to the oxidizing plasma.

However, Moon, discloses that an oxide layer will not increase substantially beyond an initial exposure time (Figure 6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the oxide film grows to a predetermined thickness at an end of an

initial exposure time to the oxidizing plasma, and wherein additional exposure to the oxidizing plasma beyond the initial exposure time does not result in a significant further increase in thickness of the oxide film, since, as taught by Moon, an oxide layer will not grow substantially beyond an initial exposure time.

70. In re claim 63, Thomas discloses wherein the step of forming a silicon nitride layer includes plasma deposition of silicon nitride (Column 3).

71. In re claim 65, Thomas discloses further including subjecting the oxidizable surface to a plasma containing nitrogen species prior to exposing the oxidizable surface to a plasma including oxygen (Column 3).

72. In re claim 66, Thomas discloses wherein subjecting the oxidizable surface to a plasma containing a nitrogen species includes subjecting the oxidizable surface to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Column 3).

73. In re claim 67, Thomas discloses exposing an oxidizable surface to a plasma including an oxygen species, wherein the plasma has an activity relative to the oxidizable surface; forming an oxide film having an upper surface on the oxidizable surface; regulating the plasma activity to limit a rate of formation of the oxide film; and forming an oxynitride region at the upper surface of the oxide film (Column 3).

Thomas does not show wherein the oxide film grows to a predetermined thickness at an end of an initial exposure time to the oxidizing plasma.

However, Moon, discloses that an oxide layer will not increase substantially beyond an initial exposure time (Figure 6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the oxide film grows to a predetermined thickness at an end of an initial exposure time to the oxidizing plasma, and wherein additional exposure to the oxidizing plasma beyond the initial exposure time does not result in a significant further increase in thickness of the oxide film, since, as taught by Moon, an oxide layer will not grow substantially beyond an initial exposure time.

74. In re claim 68, Thomas discloses wherein the step of forming an oxynitride region includes subjecting the oxide film to a plasma containing a nitrogen plasma (Column 3).

75. In re claim 69, Thomas discloses wherein subjecting the oxide film to a plasma containing nitrogen species includes subjecting the oxide film to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Column 3).

76. In re claim 70, Thomas discloses further including subjecting the oxidizable surface to a plasma containing a nitrogen species prior to exposing the oxidizable surface to a plasma including oxygen (Column 3).

77. In re claim 71, Thomas discloses wherein subjecting the oxidizable surface to a plasma containing a nitrogen species includes subjecting the oxidizable surface to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Column 3).

78. Claims 6, 9, 13, 17 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view of Moon as applied to claims 1 – 5, 7, 10 – 12, 14, 16, 18 – 20, 22 – 24, 35, 38 – 40, 55 – 58, 60 – 63 and 65 – 71 above, and further in view of Kwan.

In re claims 6 and 17, Thomas in view of Moon does not teach wherein bombarding the oxidizable surface with energized ions includes subjecting the oxidizable surface to a bias voltage.

However, Kwan discloses bombarding the oxidizable surface with energized ions includes subjecting the oxidizable surface to a bias voltage since the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate (Column 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to bombard the oxidizable surface with energized ions includes subjecting the oxidizable surface to a bias voltage, in the invention of Thomas in view of Moon, since, according to Kwan, the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate.

79. In re claim 9, Thomas in view of Moon does not teach wherein regulating the oxidizing plasma activity includes applying an RF bias voltage to the oxidizable surface.

However, Kwan discloses regulating the oxidizing plasma activity includes applying an RF bias voltage to the oxidizable surface, since; the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate (Column 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to regulate the oxidizing plasma activity includes applying an RF bias voltage to the oxidizable surface, in the invention of Thomas in view Moon, since, according to

Kwan, the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate.

80. In re claim 13, Thomas in view of Moon does not teach further including providing a plasma power source having an output power, and wherein regulating the oxide plasma includes limiting the output power to a predetermined level.

Kwan discloses providing a plasma power source having an output power, and wherein regulating the oxide plasma includes limiting the output power to a predetermined level, since; the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate (Column 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a plasma power source having an output power, and wherein regulating the oxide plasma includes limiting the output power to a predetermined level, in the invention of Thomas in view of Moon, since, according to Kwan, the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate.

81. In re claim 37, Thomas in view of Moon does not disclose wherein the plasma oxidation process includes applying RF bias voltage to the oxidizable surface.

However, Kwan discloses wherein the plasma oxidation process includes applying RF bias voltage to the oxidizable surface, since; the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate (Column 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to applying RF bias voltage to the oxidizable surface in the invention of Thomas in view of Moon, since, according to Kwan, the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate.

82. Claims 8 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view of Moon as applied to claims 1 – 5, 7, 10 – 12, 14, 16, 18 – 20, 22, 23, 24, 35, 38 – 40, 55 – 58, 60 – 63 and 65 – 71 above, and further in view of Denison et al.

In re claims 8 and 36, Thomas discloses further including providing a substrate having a back surface opposite a face surface, wherein the oxidizable surface includes at least a portion of the face surface.

Thomas in view of Moon does not disclose wherein regulating the oxidizing plasma activity includes contacting the back surface with a cooling medium.

Denison discloses contacting the back surface with a cooling medium to prevent a rise in temperature of the substrate due to the plasma action (Column 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to contact the back surface with a cooling medium in the invention of Thomas in view of Moon, since, according to Denison, prevents a rise in temperature of the substrate due to the plasma action.

83. Claims 15 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view of Moon as applied to claims 1 – 5, 7, 10 – 12, 14, 16, 18 – 20, 22, 23, 24, 35, 38 – 40, 55 – 58, 60 – 63 and 65 – 71 above, and further in view of Cleeves et al.

In re claims 15 and 59, Thomas in view of Moon does not disclose wherein the oxidizable surface includes a semiconductor element of an antifuse device.

However, Cleeves discloses that oxide layers can be antifuse devices (Column 10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form an antifuse device in the invention of Thomas in view Moon, since as disclosed by Cleeves, antifuse devices can be formed with oxides.

84. Claim 64 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view of Moon as applied to claims 1 – 5, 7, 10 – 12, 14, 16, 18 – 20, 22, 23, 24, 35, 38 – 40, 55 – 58, 60 – 63 and 65 – 71 above, and further in view of Kawakami et al.

Thomas in view of Moon does not disclose wherein the step of forming a silicon nitride layer includes chemical vapor deposition of silicon nitride.

However, Kawakami discloses that a high quality SiN layer can be formed, in a short time by CVD method (Column 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a silicon nitride layer includes chemical vapor deposition of silicon nitride, in the invention of Thomas in view of Moon, since, according to Kawakami, a high quality SiN layer can be formed, in a short time by CVD method.

85. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view Moon as applied to claims 1 – 5, 7, 10 – 12, 14, 16, 18 – 20, 22, 23, 24, 35, 38 – 40, 55 – 58, 60 – 63 and 65 – 71 above.

In re claim 21, Thomas in view of Moon does not show wherein the step of forming a semiconductor layer includes forming a germanium layer.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to exchange silicon with germanium since it is well known in the art that germanium is a formidable semiconductor material and silicon and germanium are art recognized equivalent for the disclose intended purposes. Also, it has been held to be within the general skill of a worker in the art to select a known material on the base of its suitability, for its intended use involves only ordinary skill in the art. *In re Leshin*, 125 USPQ 416.

86. Claims 72 – 76, 78, 81 – 83, 85, 87, 89 – 91, 93 – 99, 101 – 104 and 106 – 112 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view of Chung et l. (U. S. patent 5,930,650).

In re claim 72, Thomas in the U. S. patent 6,509,283 B1; figures 1 – 4 and related text, discloses, exposing an oxidizable surface to an oxidizing plasma, wherein the oxidizing plasma has an activity relative to the oxidizable surface; forming an oxide film on the oxidizable surface; and regulating the oxidizing plasma activity to limit a rate of formation of the oxide film (Column 3).

However, Thomas does not disclose regulating at least one of the following: reaction kinetics, growth initiation, and surface energy.

Chung in the U. S. patent 5,930,650; figures 1 – 6 and related text discloses that reaction kinetics is a process variable of a reaction process (column 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to regulate at least one of the following: reaction kinetics, growth initiation and surface energy in the invention of Thomas, since as taught by Chung, reaction kinetics is a process variable and discovering the optimum or workable ranges requires only routine experimentation.

87. In re claim 73, Thomas discloses wherein regulating the oxidizing plasma activity includes bombarding the oxidizable surface with energized ions prior to exposing the oxidizable surface to the oxidizing plasma (Column 1).

88. In re claim 74, Thomas discloses wherein bombarding the oxidizable surface includes bombarding the oxidizable surface to remove contaminants from the oxidizable surface (Column 1).

89. In re claim 75, Thomas discloses wherein bombarding the oxidizable surface includes bombarding the oxidizable surface to remove other oxide layer present on the oxidizable surface (Column 1).

90. In re claim 76, Thomas discloses wherein bombarding the oxidizable surface includes bombarding the oxidizable surface to facet the oxidizing surface (Column 1).

91. In re claim 78, Thomas discloses wherein regulating the oxidizing plasma activity includes diluting the oxidizing plasma with an inert gas (Column 2).

92. In re claim 81, Thomas discloses providing a plasma chamber; placing a substrate in the plasma chamber; and igniting the oxidizing plasma after placing the substrate in the plasma chamber (Figure 3).

93. In re claim 82, Thomas discloses further includes igniting an inert gas plasma prior to igniting the oxidizing plasma (Figure 3).

94. In re claim 83, Thomas discloses further including placing the oxidizable surface in the inert gas plasma (Figure 3).

95. In re claim 85, Thomas discloses wherein the oxidizable surface includes silicon (Figure 1).

96. In re claim 87, Thomas discloses wherein exposing an oxidizable surface to an oxidizing plasma includes exposing the oxidizable surface to a plasma including oxygen (Figure 3).

97. In re claim 89, Thomas discloses forming a semiconductor layer; exposing the semiconductor layer to a plasma including oxygen, wherein the plasma has an activity relative to the semiconductor layer; forming an oxide film on the semiconductor layer; and regulating the plasma activity to limit a rate formation of the oxide film (Column 3).

However, Thomas does not disclose regulating at least one of the following: reaction kinetics, growth initiation, and surface energy.

Chung discloses that reaction kinetics is a process variable of a reaction process (column 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to regulate at least one of the following: reaction kinetics, growth initiation and surface energy in the invention of Thomas, since as taught by Chung, reaction kinetics is a

process variable and discovering the optimum or workable ranges requires only routine experimentation.

98. In re claim 90, Thomas discloses wherein the step of forming a semiconductor layer includes forming a doped semiconductor layer (Figure 1).

99. In re claim 91, Thomas discloses wherein the step of forming a semiconductor layer includes forming a silicon layer (Figure 1).

100. In re claim 93, Thomas discloses further including an electrically conductive layer prior to forming the semiconductor layer (Column 1).

101. In re claim 94, Thomas discloses wherein the oxide film includes a gate oxide layer (Column 1).

102. In re claim 95, Thomas discloses wherein the oxide film includes a passivation layer (Column 1).

103. In re claim 96, Thomas discloses exposing an oxidizable surface to a plasma including an oxygen species and a nitrogen species, wherein the plasma has an activity relative to the oxidizable surface; forming an oxynitride film on the oxidizable surface; and regulating the plasma activity to limit a rate of formation of the oxynitride film (Abstract and Figure 3).

However, Thomas does not disclose regulating at least one of the following: reaction kinetics, growth initiation, and surface energy.

Chung discloses that reaction kinetics is a process variable of a reaction process (column 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to regulate at least one of the following: reaction kinetics, growth initiation

and surface energy in the invention of Thomas, since as taught by Chung, reaction kinetics is a process variable and discovering the optimum or workable ranges requires only routine experimentation.

104. In re claim 97, Thomas discloses wherein the nitrogen species includes a compound selected from the group consisting of nitrogen, ammonia and nitrous oxide (Figure 3).

105. In re claim 98, Thomas discloses wherein the step of forming an oxynitride film includes a gate oxide layer (Figure 1).

106. In re claim 99, Thomas discloses wherein the step of forming an oxynitride film includes a passivation layer (Figure 1).

107. In re claim 101, Thomas discloses further including subjecting the oxidizable surface to a plasma containing a nitrogen species prior to exposing the oxidizable surface to a plasma including an oxygen species and a nitrogen species (Figure 3).

108. In re claim 102, Thomas discloses wherein subjecting the oxidizable surface to a plasma containing a nitrogen species includes subjecting the oxidizable surface to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Figure 3).

109. In re claim 103, Thomas discloses exposing an oxidizable surface to a plasma including oxygen, wherein the plasma has an activity relative to the oxidizable surface; forming an oxide film on the oxidizable surface; regulating the plasma activity to limit a rate of formation of the oxide film; and forming a silicon nitride layer overlying the oxide film (Column 3).

However, Thomas does not disclose regulating at least one of the following: reaction kinetics, growth initiation, and surface energy.

Chung discloses that reaction kinetics is a process variable of a reaction process (column 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to regulate at least one of the following: reaction kinetics, growth initiation and surface energy in the invention of Thomas, since as taught by Chung, reaction kinetics is a process variable and discovering the optimum or workable ranges requires only routine experimentation.

110. In re claim 104, Thomas discloses wherein the step of forming a silicon nitride layer includes plasma deposition of silicon nitride (Column 3).

111. In re claim 106, Thomas discloses further including subjecting the oxidizable surface to a plasma containing nitrogen species prior to exposing the oxidizable surface to a plasma including oxygen (Column 3).

112. In re claim 107, Thomas discloses wherein subjecting the oxidizable surface to a plasma containing a nitrogen species includes subjecting the oxidizable surface to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Column 3).

113. In re claim 108, Thomas discloses exposing an oxidizable surface to a plasma including an oxygen species, wherein the plasma has an activity relative to the oxidizable surface; forming an oxide film having an upper surface on the oxidizable surface; regulating the plasma activity to limit a rate of formation of the oxide film; and forming an oxynitride region at the upper surface of the oxide film (Column 3).

However, Thomas does not disclose regulating at least one of the following: reaction kinetics, growth initiation, and surface energy.

Chung discloses that reaction kinetics is a process variable of a reaction process (column 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to regulate at least one of the following: reaction kinetics, growth initiation and surface energy in the invention of Thomas, since as taught by Chung, reaction kinetics is a process variable and discovering the optimum or workable ranges requires only routine experimentation.

114. In re claim 109, Thomas discloses wherein the step of forming an oxynitride region includes subjecting the oxide film to a plasma containing a nitrogen plasma (Column 3).

115. In re claim 110, Thomas discloses wherein subjecting the oxide film to a plasma containing nitrogen species includes subjecting the oxide film to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Column 3).

116. In re claim 111, Thomas discloses further including subjecting the oxidizable surface to a plasma containing a nitrogen species prior to exposing the oxidizable surface to a plasma including oxygen (Column 3).

117. In re claim 112, Thomas discloses wherein subjecting the oxidizable surface to a plasma containing a nitrogen species includes subjecting the oxidizable surface to a plasma formed by a gas selected from the group consisting of nitrogen, nitrous oxide and ammonia (Column 3).

118. Claims 77, 80, 84 and 88 rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view of Chung as applied to claims 72 – 76, 78, 81 – 83, 85, 87, 89 – 91, 93 – 99, 101 – 104 and 106 – 112 above, and further in view of Kwan.

In re claims 77 and 88, Thomas in view of Chung does not teach wherein bombarding the oxidizable surface with energized ions includes subjecting the oxidizable surface to a bias voltage.

However, Kwan discloses bombarding the oxidizable surface with energized ions includes subjecting the oxidizable surface to a bias voltage since the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate (Column 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to bombard the oxidizable surface with energized ions includes subjecting the oxidizable surface to a bias voltage, in the invention of Thomas in view of Chung, since, according to Kwan, the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate.

119. In re claim 80, Thomas in view of Chung does not teach wherein regulating the oxidizing plasma activity includes applying an RF bias voltage to the oxidizable surface.

However, Kwan discloses regulating the oxidizing plasma activity includes applying an RF bias voltage to the oxidizable surface, since; the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the +surface of the substrate (Column 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to regulate the oxidizing plasma activity includes applying an RF bias voltage to the oxidizable surface, in the invention of Thomas in view of Kwan, since, according

to Kwan, the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate.

120. In re claim 84, Thomas in view of Chung does not teach further including providing a plasma power source having an output power, and wherein regulating the oxide plasma includes limiting the output power to a predetermined level.

Kwan discloses providing a plasma power source having an output power, and wherein regulating the oxide plasma includes limiting the output power to a predetermined level, since; the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate (Column 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a plasma power source having an output power, and wherein regulating the oxide plasma includes limiting the output power to a predetermined level, in the invention of Thomas, since, according to Kwan, the bias plasma serves to enhance the transport of plasma species (i.e. ions) created by the plasma source system to the surface of the substrate.

121. Claim 79 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view of Chung as applied to claims 72 – 76, 78, 81 – 83, 85, 87, 89 – 91, 93 – 99, 101 – 104 and 106 – 112 above, and further in view of Denison et al.

Thomas discloses further including providing a substrate having a back surface opposite a face surface, wherein the oxidizable surface includes at least a portion of the face surface.

Thomas in view of Chung does not disclose wherein regulating the oxidizing plasma activity includes contacting the back surface with a cooling medium.

Denison discloses contacting the back surface with a cooling medium to prevent a rise in temperature of the substrate due to the plasma action (Column 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to contact the back surface with a cooling medium in the invention of Thomas in view of Chung, since, according to Denison, prevents a rise in temperature of the substrate due to the plasma action.

122. Claims 86 and 100 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas as applied to claims 72 – 76, 78, 81 – 83, 85, 87, 89 – 91, 93 – 99, 101 – 104 and 106 – 112 above, and further in view of Cleeves et al.

In re claims 86 and 100, Thomas in view of Chung does not disclose wherein the oxidizable surface includes a semiconductor element of an antifuse device.

However, Cleeves discloses that oxide layers can be antifuse devices (Column 10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form an antifuse device in the invention of Thomas, since as disclosed by Cleeves, antifuse devices can be formed with oxides.

123. Claim 105 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view of Chung as applied to claims 72 – 76, 78, 81 – 83, 85, 87, 89 – 91, 93 – 99, 101 – 104 and 106 – 112 above, and further in view of Kawakami et al.

Thomas in view of Chung does not disclose wherein the step of forming a silicon nitride layer includes chemical vapor deposition of silicon nitride.

However, Kawakami discloses that a high quality SiN layer can be formed, in a short time by CVD method (Column 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a silicon nitride layer includes chemical vapor deposition of silicon nitride, in the invention of Thomas in view of Chung, since, according to Kawakami, a high quality SiN layer can be formed, in a short time by CVD method.

124. Claim 92 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view of Chung as applied to claims 72 – 76, 78, 81 – 83, 85, 87, 89 – 91, 93 – 99, 101 – 104 and 106 – 112 above.

Thomas in view of Chung does not show wherein the step of forming a semiconductor layer includes forming a germanium layer.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to exchange silicon with germanium since it is well known in the art that germanium is a formidable semiconductor material and silicon and germanium are art recognized equivalent for the disclose intended purposes. Also, it has been held to be within the general skill of a worker in the art to select a known material on the base of its suitability, for its intended use involves only ordinary skill in the art. *In re Leshin*, 125 USPQ 416.

Response to Arguments

125. Applicant's arguments filed 24 September 2004 have been fully considered but they are not persuasive for the following reasons.

126. Applicant contests that the method of Thomas is not a plasma oxidizing method but instead a thermal oxidizing method.

Examiner respectfully submits that the method of Thomas is a plasma oxidizing method as stated in column 3 lines 25 – 41. Thomas forms the oxygen plasma at a remote location and then drives it to where the wafer (or wafers) is, to form a SiO_x layer. Furthermore, the temperature that Applicant argues that is the oxidation temperature is the ceramic so that the oxygen can be atomized inside the reactor while the silicon substrate is heated to a temperature of 500°C. The oxygen is converted into plasma outside the reactor, a process known as remote plasma. The claims do not limit what kind of plasma procedure is being done. Hence the oxidation of Thomas is conducted in a plasma environment.

127. Applicant also contests that the method of Moon and the method of Thomas cannot be combined.

Examiner respectfully submits that Moon teaches that an oxide layer will not grow either in atmosphere or an oxygen gas. The method of Thomas utilizes an oxygen gas. Thomas discloses also that the oxidizing gas can have nitrogen; it is well known that the composition of air is mainly oxygen and nitrogen.

128. Applicant's 1.132 declaration has been entered and noted, however, Examiner believes that the statements were made by taking the teachings of Thomas out of context. Therefore, the declaration is not persuasive.

129. Applicant's arguments did not overcome the rejection as stated above. Therefore, the 35 USC §102 and §103 still stand and are considered proper.

Conclusion

130. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fernando L. Toledo whose telephone number is 571-272-1867. The examiner can normally be reached on Mon-Thu 7am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

George Fourson
Primary Examiner

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

George Fourson
Primary Examiner
Art Unit 2823

FToledo
9 December 2004